

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1-13. (Cancelled)

14. (Previously Presented) The method for producing a fine carbon fiber as described in claim 35, wherein only a portion of the reacted gas is cooled by the second reacted gas-cooling apparatus.

15. (Previously Presented) The method for producing a fine carbon fiber as described in claim 35, wherein all of the reacted gas is cooled by the second reacted gas-cooling apparatus.

16. (Currently Amended) The method for producing a fine carbon fiber as described in claim 33, wherein recycling part of the cooled reacted gas comprises recycling 20 % or more of the cooled reacted gas-is-recycled.

17. (Currently Amended) The method for producing a fine carbon fiber as described in claim 35, wherein recycling the second-cooled reacted gas comprises recycling 20 % or more of the second-cooled reacted gas-is-recycled.

18. (Currently Amended) The method for producing a fine carbon fiber as described in claim 14, wherein recycling the second-cooled reacted gas comprises recycling 20 % or more of the second-cooled reacted gas-is-recycled.

19. (Currently Amended) The method for producing a fine carbon fiber as described in claim 15, wherein recycling the second-cooled reacted gas comprises recycling 20 % or more of the second-cooled reacted gas-is-recycled.

20. (Currently Amended) The method for producing a fine carbon fiber as described in claim 33, wherein recycling part of the cooled reacted gas comprises recycling 50 % or more of the cooled reacted gas-is-recycled.

21. (Currently Amended) The method for producing a fine carbon fiber as described in claim 35, wherein recycling the second-cooled reacted gas comprises recycling 50 % or more of the second-cooled reacted gas-is-recycled.

22. (Currently Amended) The method for producing a fine carbon fiber as described in claim 14, wherein recycling the second-cooled reacted gas comprises recycling 50 % or more of the second-cooled reacted gas-is-recycled.

23. (Currently Amended) The method claim 15, wherein recycling the second-cooled reacted gas comprises recycling 50 % or more of the second-cooled reacted gas-is-recycled.

24. (Cancelled)

25. (Withdrawn with traverse) The apparatus for producing a fine carbon fiber as described in claim 36, wherein the second reacted gas-cooling apparatus comprises a mechanism in which the reacted gas is cooled to a temperature between 40°C and 150°C, inclusive, and then separated by a filter.

26. (Previously Presented) The method for producing a fine carbon fiber as described in claim 35, wherein the moisture separator uses at least one of the techniques of: distillation, adsorption and membrane separation.

27. (Previously Presented) The method for producing a fine carbon fiber as described in claim 33, wherein the fine carbon fiber has a fiber diameter between 0.1 nm and 1 nm, inclusive.

28. (Previously Presented) The method for producing a fine carbon fiber as described in claim 35, wherein the fine carbon fiber has a fiber diameter between 0.1 nm and 1 nm, inclusive.

29. (Currently Amended) The method for producing a fine carbon fiber as described in ~~claim 26~~claim 28, wherein the fine carbon fiber comprises a single-walled carbon nanotube with a fiber diameter of 5 nm or less and which has an axial chiral structure.

30. (Previously Presented) The method for producing a fine carbon fiber as described in claim 27, wherein the fine carbon fiber comprises a single-walled carbon nanotube with a fiber diameter of 5 nm or less and which has an axial chiral structure.

31. (Currently Amended) The method for producing a fine carbon fiber as described in ~~claim 26~~claim 28, wherein the fine carbon fiber comprises a multi-walled carbon nanotube with a fiber diameter of 10 nm or less and which has an axial chiral structure.

32. (Currently Amended) The method for producing a fine carbon fiber as described in claim 27, wherein the fine carbon fiber comprises a multi-walled carbon nanotube with a fiber diameter of 10 nm or less and which has an axial chiral structure.

33. (Currently Amended) A method of producing a fine carbon fiber, said method comprising:

thermally decomposing at least one organic compound containing an IUPAC group 16 periodic table element, using ultra fine particles of at least one transition metal as a catalyst, wherein said thermally decomposing leads to the creation of a reacted reaction gas;

first collecting fine carbon fiber resulting from said thermal decomposition from the reacted reaction gas with a first fine carbon fiber-separating and collecting apparatus, wherein said fine carbon fiber is separated from said catalyst prior to first collecting;

cooling said reacted reaction gas after said first collecting by passing said reacted reaction gas through a gas-cooling apparatus;

second collecting fine carbon fiber resulting from said thermal decomposition from said the cooled reacted reaction gas passing through a reacted gas cooling apparatus with a second fine carbon fiber-separating and collecting apparatus; and

recycling part of the cooled reacted gas after second collecting by passing said cooled reacted gas through a gas-recycling apparatus for subsequent thermal decomposition cycles.

34. (Withdrawn with traverse) An apparatus for producing a fine carbon fiber by a method of thermal decomposition of at least one organic compound containing an IUPAC group 16 periodic table element, using ultra fine particles of at least one transition metal as a catalyst, the apparatus comprising:

- a raw material gas-feeding part,
- a carrier gas-feeding part,
- a reaction furnace,
- a first fine carbon fiber-separating and collecting apparatus,
- a fine carbon fiber tank,
- a reacted gas-cooling apparatus,
- a second fine carbon fiber-separating and collecting apparatus, and
- a gas-recycling apparatus, wherein the fine carbon fiber is collected from the reacted gas passing through the fine carbon fiber-separating and collecting apparatus and the reacted gas-cooling apparatus by the second fine carbon fiber-separating and collecting apparatus, and then a part of the reacted gas is recycled by the gas-recycling apparatus.

35. (Currently Amended) A method for producing a fine carbon fiber, said method comprising:

thermally decomposing at least one organic compound containing an IUPAC group 16 periodic table element, using a ultra fine particles of at least one transition metal as a catalyst, wherein said thermally decomposing leads to the creation of a reacted reaction gas;

first collecting fine carbon fiber from reacted reaction gas passing through a first fine carbon fiber-separating and collecting apparatus, wherein said fine carbon fiber is separated from said catalyst prior to first collecting; and

first cooling the reacted reaction gas with a first reacted gas-cooling apparatus after first collecting;

second collecting fine carbon fiber from the first cooled reaction gas with a second fine carbon fiber-separating and collecting apparatus;

second cooling the reacted reaction gas after collecting with a second reacted gas-cooling apparatus to separate condensate from said gas; and

recycling said the second-cooled reacted gas with a gas-recycling apparatus, wherein water and high boiling point by-products are separated from the condensate formed during second cooling by a moisture separator;

and to further recycle recycling unreacted raw material organic compound separated from the reacted gas during second cooling or moisture separation.

36. (Withdrawn with traverse) An apparatus for producing a fine carbon fiber by a method of decomposition of at least one organic compound containing an IUPAC group 16 periodic table element, using ultra fine particles of at least one transition metal as a catalyst, the apparatus comprising:

- a raw material gas-feeding part,
- a carrier gas-feeding part,
- a reaction furnace,
- a first fine carbon fiber-separating and collecting apparatus,
- a fine carbon fiber tank,
- a reacted gas-cooling apparatus,
- a second fine carbon fiber-separating and collecting apparatus,
- a gas-recycling apparatus,
- a second reacted gas-cooling apparatus,

a condensate tank and a moisture separator, wherein the fine carbon fiber is collected from reacted reaction gas passing through the first fine carbon fiber-separating and collecting apparatus and the reacted gas-cooling apparatus by the second fine carbon fiber-separating and collecting apparatus, and then the reacted gas is cooled by the second reacted gas-cooling apparatus to separate condensate, after which the cooled, reacted gas is recycled by the gas-recycling apparatus, and further wherein water and unwanted by-products are further separated from the condensate by the moisture separator to enable the re-gasification and recycling of unreacted compound remaining in said further separated condensate.